

U.S. GEOLOGICAL SURVEY  
CHARLES D. WALCOTT, DIRECTOR

# ECONOMIC GEOLOGY

WYOMING-SOUTH DAKOTA  
NEWCASTLE QUADRANGLE

## LEGEND

Known  
productive  
areas



Outcrop of horizon  
of principle coal  
bed in Cambria  
basin



Approximate area  
in which coal bed  
is over five feet thick



Area of coal work-  
ings at end of 1901



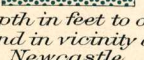
Outcrop of oil  
sand in Graneros  
formation  
(contains petroleum  
in vicinity of Newcastle  
and possibly elsewhere)



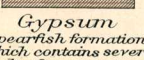
Depth in feet to oil  
sand in vicinity of  
Newcastle



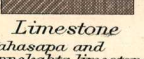
Cyprian  
(Speerish formation  
which contains several  
beds of gypsum)



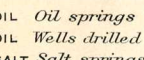
Limestone  
(Dakota and  
Minnokahta limestones)



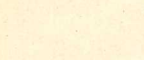
Coal mine tunnels



Oil wells drilled for oil



Salt lake springs



Bentonite quarries



## LEGEND

SEDIMENTARY ROCKS  
(Areas of subaqueous  
deposits are shown by  
patterns of parallel lines;  
subaerial deposits by  
patterns of dots and  
circles.)

Recent

Qal

Alluvium  
(only the larger de-  
posits represented)

Ql

Older terrace  
deposits  
(gravel and loam)

Kl

Laramie  
formation  
(sandstone and  
carbonaceous shale)

Kfh

Fox Hills  
formation  
(sandstone and  
sandy shale)

Kp

Pierre shale  
(dark gray shale or clay  
with concretions)

Kn

Limestone  
lenticles in  
Pierre shale  
(from Tapes batesi)

Kcr

Niobrara  
formation  
(fine shale and  
impure shale)

Kg

Carlisle  
formation  
(gray shale and  
thin sandstone)

Kgs

Greenhorn  
limestone  
(impure shaly  
limestone)

Kp

Graneros  
formation  
exclusive of  
sandstone lenticles

Ks

Sandstone lenticles  
in Graneros  
formation

Kd

Dakota  
sandstone  
(brownish sandstone,  
mostly massive)

Kf

Fuson  
formation  
(shale and sandstone)

Klk

Lakota  
sandstone  
(massive buff sandstone  
with local coal beds near  
base)

Km

Morrison  
shale  
(massive sandy shale,  
gray greenish, and  
maroon)

Jad

Sundance  
formation  
(buff sandstone and  
red and greenish-gray  
shale)

Rs

Spearfish  
formation  
(red sandy shale  
with beds of gypsum,  
red beds)

Cmk

Minnokahta  
limestone  
(very thin bedded  
gray limestone)

Co

Opeche  
formation  
(bright red sandy shale)

Cml

Minnelusa  
sandstone  
(gray red, and buff,  
lens sandstone)

Cp

Pahasapa  
limestone  
(massive gray limestone)

Sections

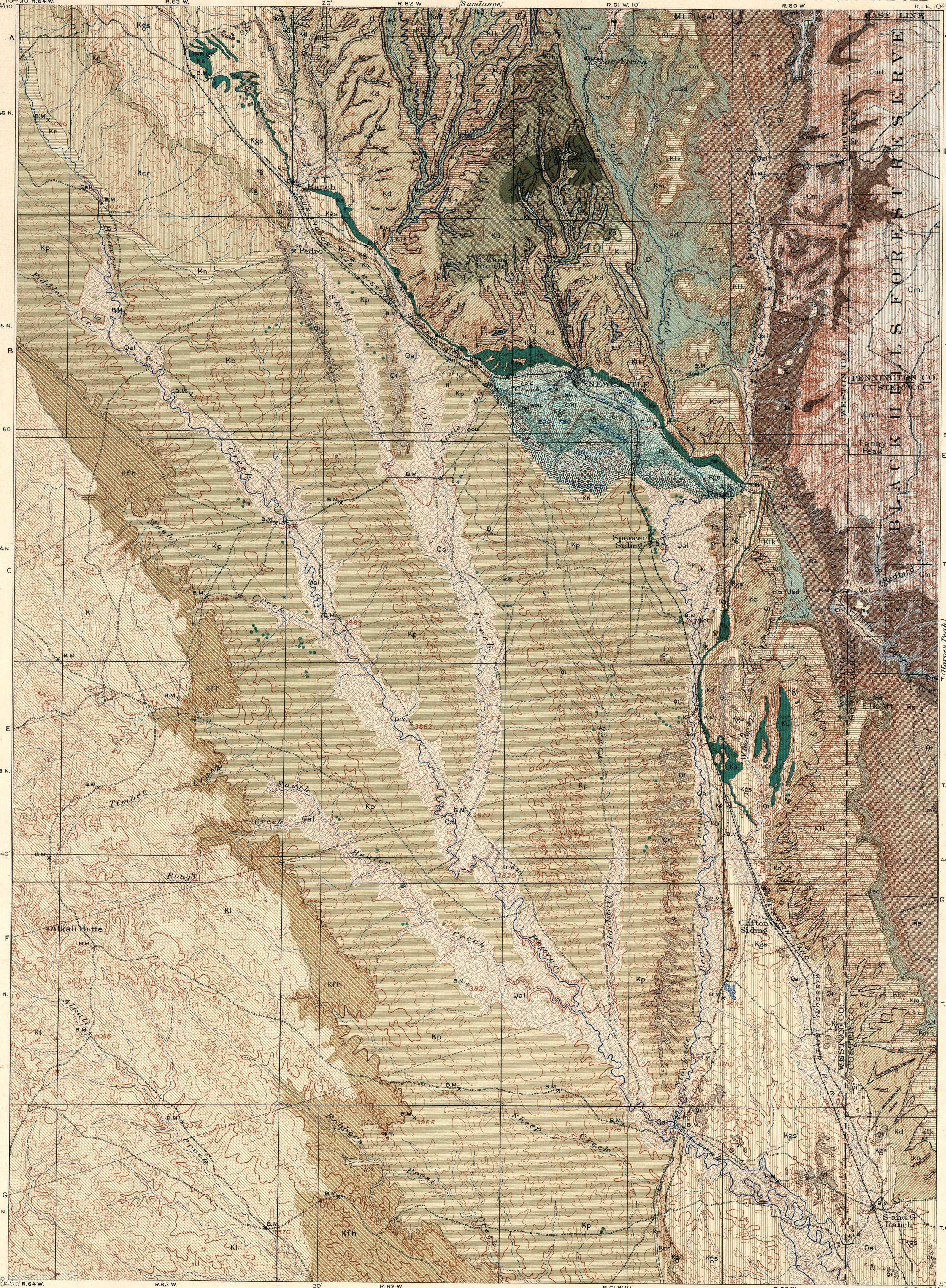
Diagram of townships

Geology by N.H. Darton.

Assisted by C.A. Fisher.

Surveyed 1899-1901.

Legend is continued  
on the left margin.



E.M. Douglas, Geographer in charge.  
Triangulation by Frank Tweedy and R.H. Chapman.  
Topography by W.H. Herron.  
Surveyed in 1899.

Scale 1:25000  
1 inch = 2 miles  
1 centimeter = 200 meters  
Contour interval 50 feet.  
Datum is mean sea level.  
Edition of Sept. 1903.

Diagram of townships

Geology by N.H. Darton.  
Assisted by C.A. Fisher.  
Surveyed 1899-1901.